

**PARUPENEUS MARGARITATUS, A NEW SPECIES OF GOATFISH
(MULLIDAE) FROM THE PERSIAN GULF AND GULF OF OMAN.**

by

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RÉSUMÉ. — *Parupeneus margaritatus*, n. sp. est décrit d'après des exemplaires provenant du Golfe Persique et du Golfe d'Oman ainsi que d'un exemplaire dont la provenance serait Madras sur la côte Est de l'Inde. Cette espèce se distingue par sa forme modérément allongée (hauteur comprise 3,5 - 4,35 fois dans LS), un long museau (1,75 - 3,0 fois dans la tête), une petite bouche (mâchoire supérieure 1,6 - 1,95 fois dans le museau), des barbillons relativement petits (1,45 - 1,65 fois dans la tête), 29-33 branchiospines, et une coloration sur le vivant caractérisée par un point clair sur chaque écaille le long de la partie inférieure des flancs et par une grande tache blanche en forme de selle en avant du pédoncule caudal. Elle a été confondue avec *Parupeneus rubescens* Lacepède (habituellement identifié sous les noms de *P. pleurotaenia*, *P. dispilurus* ou *P. fraterculus*) dont elle diffère par son corps plus allongé (hauteur comprise 3,0 à 3,4 dans LS chez *rubescens*), son museau plus long et sa bouche plus petite (mâchoire supérieure de *rubescens* 1,2 à 1,5 fois dans le museau), et sa coloration (*rubescens* possède une tache sombre très visible, en forme de selle, sur le pédoncule caudal, accolée et en arrière d'une tache blanche, et les écailles de *rubescens* sont dépourvues de points clairs), *P. margaritatus* est une petite espèce; le plus grand exemplaire étudié mesure 182,5 mm LS, tandis que le plus grand *P. rubescens* mesure 326 mm SL.

ABSTRACT. — *Parupeneus margaritatus*, n. sp., is described from specimens from the Persian Gulf and Gulf of Oman and one specimen allegedly from Madras on the east coast of India. It is distinctive in having a moderately elongate body (depth 3.5-4.35 in SL), long snout (1.75-3.0 in head), small mouth (upper jaw 1.4-1.95 in snout), relatively short barbels (1.45-1.65 in head), 29-33 gill rakers, and a color pattern in life of a pale spot on each scale along lower side of body and a large white-saddle-like spot anteriorly on caudal peduncle. It has been confused with *Parupeneus rubescens* (Lacepède) (usually identified as *P. pleurotaenia*, *P. dispilurus*, or *P. fraterculus*) from which it differs in the more slender body (depth of *rubescens* 3.0 to 3.4 in SL), longer snout and smaller mouth (upper jaw of *rubescens* 1.2 to 1.5 in snout), and color (*rubescens* has a prominent dark saddle-like spot on caudal peduncle adjacent and posterior to a white one, and it lacks the small pale spots on the body). *P. margaritatus* is a small species; the largest examined is 182.5 mm SL, whereas the largest *P. rubescens* measures 362 mm SL.

Key-words : *Parupeneus margaritatus*, new species, Teleostean, Mullidae, ISW Persian Gulf, ISW Oman Gulf.

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INTRODUCTION

The senior author, Gerald R. Allen and William F. Smith-Vaniz collected fishes in the Persian Gulf and Gulf of Oman in 1977 during an FAO-UNDP exploratory fishing survey which was carried out principally by trawlers. Among the specimens collected in the Persian Gulf was a small species of goatfish which was identified as *Parupeneus pleurotaenia* by Randall, Allen and Smith-Vaniz, 1978. This fish has a white saddle-like spot on the caudal peduncle and a series of pale spots, one per scale, along the lower side of the body.

Recently the holotype of *Mullus pleurotaenia* Playfair and Günther (1867), as well as the holotype of *M. dispilurus* (described by the same authors in the same volume on Zanzibar fishes), was examined at the British Museum (Natural History). Both these names have been applied to a widespread Indo-Pacific mullid fish which has a white saddle-like spot anterodorsally on the caudal peduncle; however, this spot is immediately followed by a prominent blackish one of about the same size. Suspicion was aroused that the Gulf specimens might have been misidentified.

Examination of the holotype of *Upeneus fraterculus* Valenciennes in Cuvier and Valenciennes (1831) at the Muséum National d'Histoire Naturelle revealed that it is the same species as *pleurotaenia* and *dispilurus*; since it is the older name, it has priority. However, this name, in turn, is a junior synonym of *Mullus rubescens* Lacepède (1801), as shown by Randall (1983 : 89, col. figs. pp. 88, 89). Although no type-specimen of *rubescens* is extant and Lacepède's description is very brief, it is clear that this name could not apply to any other goatfish in the western Indian Ocean. At the senior author's suggestion, Maugé and Guézé (1984) have designated a neotype of *Mullus rubescens* from La Réunion.

In October, 1983 the senior author had a second opportunity to conduct field work in the Persian Gulf, based at the Directorate of Fisheries in Bahrain. A special effort was made to collect and photograph the mullid that had been mistakenly identified as *Parupeneus pleurotaenia*. A series of specimens was obtained, and a photograph was taken of one (Plate 1 A). Underwater photos were taken off Bahrain (Plate 1 B). Some had been made previously of the species in the Gulf of Oman (Plate 1 C). As no name could be found for this fish, the senior author conferred with the junior author at the Museum National d'Histoire Naturelle in Paris after the field work in Bahrain. It was learned that he also had concluded that this goatfish is a new species as a result of the examination of a specimen supposedly collected at Madras, India by Sir Francis Day (MNHN A. 3517). The present paper represents a collaboration to describe this species and distinguish it from related goatfishes.

MATERIALS AND METHODS

The following definitions are provided for measurements taken on type-specimens : Standard length (SL) is the horizontal distance from the tip of the snout (front of upper lip in median line) to the base of the caudal fin (end of hypural plate). Body depth is the maximum depth of the body, excluding the fins and ad-

justing for any obvious malformations from preservation. Body width is taken just posterior to the gill opening. Head length is the distance from the most anterior point of the snout to the most posterior edge of the opercular membrane. Snout length is measured from the most anterior median point of the upper lip to the fleshy edge of the orbit. Orbit diameter is the maximum fleshy diameter. Inter-orbital width is the minimum bony width. Upper jaw length is measured from the front of the upper lip in the median line to the most posterior point of the membranous edge of the maxilla. Barbel length is taken from the most anterior point at the base of the barbels to the tips with barbels horizontal. Caudal peduncle depth is the least depth. Caudal peduncle length is measured horizontally from the rear base of the anal fin to the caudal fin base. Fin spine and soft ray measurements are taken from the point they emerge from scaled part of the body (not to their extreme bases). Caudal fin length is the horizontal distance from the base of the fin to a vertical at the distal end of the longest ray. Caudal concavity is the horizontal distance between verticals at the tips of the shortest and longest rays.

Lateral-line scales were counted from behind the upper end of the gill opening to the base of the caudal fin. The three pored scales that are found posterior to the caudal-fin base were not included in this count. Gill rakers were counted on the first gill arch; they include all rudiments. The upper-limb counts are given first; the raker at the angle is contained in the lower-limb count.

Type-specimens of the new species have been deposited at the following institutions : Australian Museum, Sydney (AMS); British Museum (Natural History), London (BMNH); Bernice P. Bishop Museum, Honolulu (BPBM); California Academy of Sciences, San Francisco (CAS); Hebrew University, Jerusalem (HUJ); Museum of Comparative Zoology, Harvard University, Cambridge (MCZ); Museum National d'Histoire Naturelle, Paris (MNHN); National Science Museum, Tokyo (NSMT); J.L.B. Smith Institute of Ichthyology, Grahamstown (RUSI); U.S. National Museum of Natural History, Washington, D.C. (USNM) and Ludwigburg Stadt Museum (LSM).

The following specimens of *Parupeneus rubescens* were examined : BMNH 1867.3.9.82, holotype of *Upeneus dispilurus*, 228 mm SL (dried skin), Zanzibar; BPBM 18308, 3 : 97-107 mm SL, Gulf of Aqaba, Red Sea; BPBM 19829, 4 : 142-212 mm SL, Gulf of Aqaba, Red Sea; MCZ 6010, 3 : 134-175 mm SL, Mauritius; MCZ 615, 3 : 140-181 mm SL, Mauritius; BMNH 1867.3.9.500-501, 85.5 mm SL, Zanzibar; MNHN 1965-44, 1966-853, 174-326 mm SL, La Réunion; MNHN 1980-1056, 2 : 129-141 mm SL, Gulf of Suez; MNHN 1965-58, neotype of *Mullus rubescens*, 237 mm SL, La Réunion; USNM 265787, 2 : 198-205 mm SL, Somalia, 11°14'N, 51°08'E. LSM no collection number, 4 syntypes of *Mullus notospilus* Klunzinger, 1884, 78-90 mm SL, Koseir; BMNH 1901.2.9.20-22, 71-80 mm SL, Charbar. MNHN 1982-35, 2 : 208-222 mm SL, Seychelles; MNHN 1984-453, 91 mm SL, Red Sea; USNM 266973, 208 mm SL, Somalia, 9°25'N, 50°54'E; USNM 266977, 2 : 94-177 mm SL, Somalia, 11°18'N, 51°08'E; USNM 266994, 3 : 204-218 mm SL, Somalia, 10°N, 51°15'E; USNM 267048, 2 : 215-235 mm SL, Somalia, 11°37'N, 51°27'E.



A. Holotype of *Parupeneus margaritatus*, BPBM 29573, 145 mm SL, Bahrain (photo by J. Randall).



B. *Parupeneus margaritatus*, off Bahrain (underwater photo by J. Randall).



C. *Parupeneus margaritatus*, off Muttrah, Gulf of Oman (underwater photo by J. Randall).

In the description of the new species, data in parentheses refer to paratypes. Proportional measurements in the text are rounded to the nearest 0.05.

Parupeneus margaritatus, new species.

Plate 1, A-C; Tables I-III

Upeneus displurus (non Playfair and Günther) Day, 1875, p. 125, plate 31, fig. 3 (Sind, Pakistan).

Upeneus dispilurus (non Playfair and Günther) Boulenger, 1887, p. 650 (Muscat, Oman).

Upeneus pleurotaenia (non Playfair and Günther) Boulenger, 1889, p. 239 (Muscat, Oman).

Parupeneus pleurotaenia (non Playfair and Günther) Randall, Allen and Smith-Vaniz, 1978, p. 120, fig., col. fig. 36 (Bahrain); Sivasubramanian and Ibrahim, 1982, p. 95, col. fig. (Qatar).

HOLOTYPE : BPBM 29573, 145.0 mm SL, male, Persian Gulf, Bahrain fish market, J.E. Randall, 3 November 1983.

PARATYPES : MNHN A. 3517, 128.5 mm SL, India, Madras, F. Day, 1876; BMNH 1887.11.11. 125-127, 3 : 144-152 mm SL, Gulf of Oman, Muscat, A.S.G. Jayakar, no collection date; BMNH 1889.4.15. 26-27, 2 : 143-155 mm SL, Gulf of Oman, Muscat, A.S.G. Jayakar, no collection date; BMNH 1904.5.25. 45,3 : 143-164 mm SL, Gulf of Oman, Muscat, 27.5-55 m, J.W. Townsend, no collection date; USNM 147994,8 : 96.5-116.5 mm SL, Persian Gulf, Saudi Arabia, Tarut Bay, Ras Tanura, D.S. Erdman, May-June, 1948; BPBM 29406, 2 : 111-129 mm SL, Persian Gulf, Bahrain, Fisheries Resources Bureau, 14 April 1976; BPBM 21220, 154.1 mm SL, Persian Gulf, north of Qatar, 26°56'N, 50°49'E, 54-57 m, trawl from M/V "Lemuru", W.F. Smith-Vaniz, 15 February 1977; BPBM 29410, 9 : 99-130 mm SL, Persian Gulf, 26°30.5' N, 51°22.5'E, 31-35 mm, trawl, M/V "Lummetje" Station 5, W.F. Smith-Vaniz, 28 February 1977; BMNH 1984.5.16. 1-2 : 163-169 mm SL, Oman, Mina al Fahal, 0-1.5 m, beach seine, R.N. Gibson, 16 November 1982; BMNH 1984.5.16. 151-155 : 62-77 mm SL, Oman, no collection date; MNHN 1983-677, 3 : 41.0-62.9 mm SL, Persian Gulf, off Abu Dhabi, 24°10'N, 52°43'E, 15 m, trawl, C.B. D'Lima, 17 February 1983; BPBM 29574, 3 : 112.2-182.5 mm SL; AMS 1.24445-001, 131 mm SL; BMNH 1984.3.29.1, 142.0 mm SL; CAS 54838, 165.3 mm SL; HUI 11388, 160.8 mm SL; MCZ 60804, 146.2 mm SL; NSMT-23030, 165.5 mm SL; RUSI 20063, 145.4 mm SL; USNM 265814, 160.6 mm SL - all with same data as holotype; MNHN 1984-457, 155 mm SL, Gulf of Oman, G. Bianchi, 1984.

DIAGNOSIS : A *Parupeneus* with 15-17 (usually 16) pectoral rays, 27 lateral-line scales, 29-33 gill rakers, elongate body (the depth 3.5-4.35 in SL), relatively long snout (1.75-2.0 in head of adults), but small mouth (upper jaw 1.6-1.95 in snout), relatively short barbels (1.4-1.65 in head), and a distinctive color pattern (light reddish to gray in life, shading to whitish ventrally, with a pearly white spot on each scale along side of body, and a white saddle-like spot anterodorsally on caudal peduncle). A small species, the largest examined, 182.5 mm SL.

DESCRIPTION : Dorsal rays VIII,9, (the first soft ray unbranched, the last branched to base); anal rays I,7 (first soft ray unbranched, the last branched to base); pec-

toral rays 16 (15-17 - see Table I) (upper two rays unbranched); pelvic rays 1,5; principal caudal rays 15 (upper and lower rays unbranched); upper procurrent caudal rays 10 (9-10); lower procurrent caudal rays 9 (9-10); lateral-line scales 27 (three pored scales on caudal fin base not included in count); scales above lateral line to origin of dorsal fin 2 1/2; scales below lateral line to origin of anal fin 5 1/2; circumpeduncular scales 14; median predorsal scales 13; median prepelvic scales 7; horizontal scale rows on cheek 3; gill rakers 7 + 23 (6-8 + 22-25 - see Table II); pseudobranchial filaments 28 (increasing with age: 8 in a 42-mm specimen, 26 in a 142-mm specimen, and 34 in a 182.5-mm specimen); branchiostegal rays 3; vertebrae 10 + 14 (vertebral counts of holotype and three paratypes).

Body elongate, the depth 3.8 (3.5-4.35) in SL, and moderately compressed, the width 1.6 (1.5-2.0) in depth; head length 2.95 (2.75-3.0) in SL; snout length 1.9 (1.75-2.3) in head (snout relatively longer in larger fish); orbit diameter 5.4 (4.35-5.95) in head; interorbital space convex, the least with 4.35 (3.9-4.6) in head; barbels not long, the tips usually just reaching a vertical through posterior margin of preopercle, their length 1.55 (1.45-1.65) in head; depth of caudal peduncle 2.95 (2.95-3.45) in head.

Mouth small, the maxilla reaching about two-thirds distance to a vertical at front edge of orbit, the upper jaw length 3.5 (3.0-3.55) in head; mouth slightly inferior and slightly oblique; well-spaced, peg-like, conical teeth in a single row in jaw (36 in upper jaw and 28 in lower jaw of holotype, counting broad gaps where teeth appear to be missing); no teeth on vomer or palatines; tongue fused to floor of mouth.

Posterior nostril a short curved vertical opening immediately in front of orbit slightly below level of center of eye; anterior nostril a smaller diagonal opening about three-fifths distance from orbit to front of snout at level of lower edge of orbit. Gill membranes narrowly attached to isthmus. Longest gill filaments on first gill arch about equal to orbit diameter; longest gill raker about half length of longest gill filaments.

Table I. — Pectoral ray counts of *Parupeneus margaritatus* and *P. rubescens*

	15	16	17
<i>P. margaritatus</i>	3	38	4
<i>P. rubescens</i>	5	11	2

Table II. — Gill raker counts of *Parupeneus margaritatus* and *P. rubescens*

	Upper Limb			Lower Limb					Total Gill Rakers							
	6	7	8	21	22	23	24	25	27	28	29	30	31	32	33	
<i>P. margaritatus</i>	4	32	14		4	23	15	8			6	12	21	10	2	
<i>P. rubescens</i>	16	20		2	12	15	5	2	2	5	14	7	2	1		

A single stout flat spine posteriorly on opercle at level of lower edge of orbit; preopercular margin smooth.

Scales very finely ctenoid; head fully scaled except for a small area (about

Table III. — Proportional Measurements of Type Specimens of *P. margaritatus* expressed as a Percentage of the Standard Length

	HOLOTYPE		PARATYPES							
	BPBM 29573	MNHN 1983-677	BPBM 29574	MNHN A 3517	BPBM 29574	BMNH 1984.3.29.1	MCZ 60804	BPBM 21220	CAS 54838	BPBM 29574
Standard length (mm)	145.0	62.9	112.2	128.5	131.2	142.0	146.2	154.1	165.3	182.5
Body depth	26.4	23.1	24.6	27.2	27.7	27.8	25.3	28.6	26.5	27.4
Body width	16.5	14.5	16.2	13.7	15.9	14.8	15.7	14.6	14.2	14.7
Head length	33.9	34.3	33.8	33.1	33.6	35.8	33.8	33.0	36.4	36.3
Snout length	17.7	14.8	16.9	16.2	16.9	19.5	18.0	17.6	19.8	20.6
Orbit diameter	6.3	7.9	6.5	6.2	6.6	6.7	6.3	6.0	6.1	6.1
Interorbital width	7.8	8.3	7.7	7.8	8.3	7.8	8.7	7.8	7.9	8.2
Upper jaw length	9.7	9.7	9.9	9.6	10.2	10.7	10.9	11.0	10.9	10.5
Barbel length	21.7	20.7	20.5	21.8	22.0	23.4	21.4	22.3	24.8	23.7
Caudal peduncle depth	11.4	10.1	10.7	10.1	11.4	11.5	11.1	10.9	10.5	10.8
Caudal peduncle length	22.9	22.7	23.2	24.6	22.6	22.5	23.2	22.8	22.0	22.2
Snout to origin of first dorsal fin	41.3	39.8	40.0	41.2	40.8	41.5	39.9	39.8	41.5	43.0
Snout to origin of second dorsal fin	65.4	63.5	64.2	64.8	66.9	65.0	64.0	64.3	63.9	65.2
Snout to origin of anal fin	65.0	63.6	65.3	63.5	63.7	64.7	64.5	65.0	66.2	66.2
Snout to origin of pelvic fins	32.7	30.6	33.0	32.2	32.6	34.6	34.6	32.3	33.9	32.9
Base of first dorsal fin	18.4	21.0	19.6	20.2	21.3	19.3	19.4	19.7	18.8	18.4
Base of second dorsal fin	16.0	15.9	16.6	16.1	16.8	16.0	16.3	16.7	16.4	17.0
Base of anal fin	12.5	13.5	12.8	19.9	12.6	12.7	13.2	12.2	12.3	12.2
Longest dorsal spine	18.4	18.2	17.1	22.3	19.8	19.0	19.7	16.9	broken	18.7
Longest dorsal soft ray	12.8	14.2	12.4	14.6	14.2	13.6	13.0	13.1	12.7	13.9
Longest anal soft ray	12.2	13.2	12.6	12.7	13.4	12.2	12.7	12.1	12.5	12.5
Caudal fin length	25.8	27.8	25.8	broken	25.8	27.4	26.5	24.9	25.9	27.0
Caudal concavity	13.8	13.5	15.1	broken	14.3	15.9	15.6	13.0	13.9	15.4
Pectoral fin length	21.7	23.2	21.1	23.0	21.3	22.6	21.9	22.1	21.7	21.5
Pelvic fin length	19.9	23.0	21.2	22.8	21.7	21.1	21.5	20.6	19.8	21.2

two-thirds orbit diameter in length) at front of snout anterior to a pair of scales which terminate the predorsal series, a very small area around each nostril, and front of chin; side of maxilla with two scales, a small anterior one overlapping a large posterior one; fins naked except basal half of caudal fin and two median ventral scales covering inner base of pelvic fins; pointed scaly process at lateral edge of pelvic fin base about equal in length to orbit diameter. Lateral line following contour of back; pored scales of lateral line with numerous branched tubules.

Origin of first dorsal fin above fourth lateral-line scale; dorsal spines slender and flexible; first dorsal spine very short (about equal to pupil diameter); third dorsal spine longest (though fourth nearly as long), 1.85 (1.65-1.95) in head; origin of second dorsal fin above thirteenth to fourteenth lateral-line scales (hence slightly anterior to anus); first dorsal soft ray about two-thirds length of second ray which is the longest, 2.65 (2.25-2.85) in head; anal spine small, about equal to pupil diameter and closely adherent to first soft ray; first soft anal ray about two-thirds length of second ray which is the longest, 2.8 (2.5-2.95) in head; last dorsal and anal soft rays only slightly longer than penultimate rays; caudal fin length 1.3 (1.25-1.4) in head; caudal fin forked, the caudal concavity 2.45 (2.25-2.6) in head; pectoral fins pointed, the fourth ray longest, 1.55 (1.5-1.7) in head; origin of pelvic fins below upper base of pectoral fins; pelvic spine about two-thirds length of longest pelvic ray; second pelvic ray longest, 1.7 (1.5-1.8) in head.

Color of holotype in alcohol pale with a reddish brown stripe on side of body from behind most posterior part of opercular membrane to caudal fin base just below lateral line, this stripe from underlying dark tissue, not surface pigmentation; all fins pale without markings.

Color of holotype when fresh: body yellowish gray, the scale edges dull orange-red, shading to whitish ventrally, each scale along side of body with a small pearly white spot; head above a diagonal demarcation from middle of upper lip to just below lower edge of eye grayish orange, below whitish, sparsely mottled with light orangish red, with a large patch of silvery white below eye and a few small bluish white spots and streaks on operculum; a faint bluish white line under eye and extending a short distance diagonally onto snout; an indistinct red blotch behind eye; iris red; barbels white; first dorsal fin clear whitish with blotchy streaks of light reddish along spines; second dorsal fin pale reddish with three narrow horizontal whitish bands, the white more intense on the rays, hence appearing as spots; anal fin similar but ground color pale yellowish and the number of whitish bands four; a pronounced narrow white band at base of anal fin, this band extending onto last ray; basal part of caudal fin with large scales colored like body; rest of fin with yellowish rays and faintly pink membranes near outer edges of lobes and diagonally banded in dull yellow and whitish in centroposterior part of fin; paired fins mainly whitish.

Some specimens show a faint dark spot dorsally on the caudal peduncle behind and adjacent to the large white saddle due to dark pigment on the edges of the scales in the area of the spot. This darkening may be seen on fish in the underwater photographs. In life *P. margaritatus* exhibits a dark brown band on the head

from the front of the snout through the eye, but this generally does not persist in preserved specimens. Also, in life, the small pale spots on the body and the pale dots and lines on the head may be light blue.

Like other mullid fishes, the same individual of *P. margaritatus* can display a remarkable variation in color almost instantly, from nearly uniformly pale (as in Plate 1 B) to an overall red (Plate 1 C) or a blotchy pattern of red and whitish. When observing goatfishes feeding, the senior author has at times noted that individual fish may rapidly assume a red hue. It is believed this color change takes place when a food organism is captured.

REMARKS : This species is named *margaritatus* from the Latin for adorned with pearls, in reference to the pearl-like spots along the side of the body.

The first specimen to be reported was one from Sind, Pakistan which Day (1875 : 125, pl. 31, fig. 3) identified as *Upeneus displurus* (Playfair) (misspelling for *dispilurus*). The Museum National d'Histoire Naturelle has a specimen collected by Day from Madras on the east coast of India which he did not report in his *Fishes of India*; we include it herein as a paratype. The white spots on the side of the body and the white spot anterodorsally on the caudal peduncle show very well on this specimen (which was evidently preserved initially in alcohol). The peduncular spot is narrow where it crosses over the dorsal surface of the peduncle and broadens anteriorly on either side.

Our specimens of this goatfish have been obtained from the Persian Gulf, Gulf of Oman, Pakistan, and Madras (as mentioned above). It seems odd that we have found no material from any other locality in India. The senior author has collected fishes at Cochin and Kovalam on the west coast of India and Madras and Tuticorin on the east coast without encountering this species. Thus we cast some doubt on the single Madras locality.

P. margaritatus is common throughout the Persian Gulf. It was not reported by Blegvad (1944) in his *Fishes of the Iranian Gulf* or by Kuronuma and Abe (1972) in their *Fishes of Kuwait*. Kuronuma, however, has sent us a color photo of this mullid from Kuwait so he did obtain it there but declined to report it in the book.

In the Persian Gulf *P. margaritatus* occurs at depths of about 1 m to at least 35 m. It may be found over open sand or silty sand bottoms (hence readily trawled) or on sand or rubble in the immediate vicinity of coral reefs or rocky outcrops.

No other species of *Parupeneus* has been recorded from the Persian Gulf, but a second one does occur there, *P. heptacanthus* (Lacepède) [often identified as *P. cinnabarinus* (Cuvier) or *P. pleurospilos* (Bleeker)]. Two specimens were collected by the senior author at the Bahrain market (BPBM 29415, 260 mm SL; and one deposited at the collection of the Directorate of Fisheries in Bahrain). This species bears some resemblance to *P. margaritatus*, particularly in possessing small pale blue spots, one on each scale; however, these spots are on the upper half of the body, whereas they are below the lateral line on *P. margaritatus*. Also, *P. cinnabarinus* lacks any pale (or dark) saddle-like spot on the caudal peduncle and usually has a small brownish red spot between the pectoral fin and first dorsal fin. It has a

deeper body (depth 3.15-3.4 in SL), longer barbels (1.25-1.4 in head), and 26-29 gill rakers.

The goatfish which has most often been confused with *P. margaritatus*, as mentioned in the introduction above, is *P. rubescens* (Lacepède). Although the latter lacks small pale spots on the body, it does have a whitish saddle spot on the caudal peduncle: the dark spot which follows this, however, is very conspicuous (except in faded preserved specimens) whereas it is faint or absent on *P. margaritatus*. Also it has a more marked dark band passing from the front of the snout through the eye which continues onto the dorsoanterior part of the body. It has a deeper body (depth 3.0-3.4 in SL), longer snout and smaller mouth (upper jaw 1.2-1.4 in snout, in contrast to 1.6-1.95 for *P. margaritatus*). The two species are very similar meristically (see Tables I and II). There is a significant difference in the maximum size attained by the two. The largest specimen of *P. margaritatus* examined measures 182.5 mm SL. Specimens of *P. rubescens* in the Museum National d'Histoire Naturelle from La Réunion and Madagascar range to 326 mm SL.

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